



Exceeding Expectations

Corrosion

Corrosion is the gradual destruction of materials, (usually metals), by chemical reaction with its environment. In nature, most metals exist as stable ores of oxides, carbonates, or sulfides. Energy is required to refine them and make them useful. Corrosion is nature's way of reversing an unnatural process back to a lower energy state. In the production of oil and gas, it is vital in every step to prevent corrosion.

To learn more about this line of testing, let's apply the **AmSpec** approach.

A = Application

US industries spend billions of dollars preventing corrosion every year, with the oil industry taking on most of these costs. These costs come from the demanding production techniques and the environmental threat if the components fail. Corrosion, which is the deterioration of a metal or its properties, occurs at every stage in the life of every oil and gas field. Because it attacks components from casing strings to production platforms and affects drilling through to abandonment, corrosion is worthy of all the technology and research. Here are a few tests that are conducted in the petroleum industry to monitor different types of corrosion.

Copper Corrosion

A polished copper strip is immersed in the sample and heated under conditions of temperature and time that are specific to the class of material being tested. At the end of the heating period, the copper strip is removed, washed and the color and tarnish level assessed against the ASTM Copper Strip Corrosion Standard.



Figure 1 - Examples of Copper Strips Corroded by Various Components

If you would like to be removed from our distribution list or you require information on a certain subject, please let us know via return email. Also, please be advised individual / group AmSpec laboratory / operational tours can be arranged upon request.

Silver Corrosion

Sensors in modern automotive fuel systems often use silver or silver alloys, which are susceptible to corrosion from sulfur in gasoline. In the past decade, refiners have shifted to producing lower-sulfur gasoline, but the process requires more severe hydro-treating that destroys naturally occurring compounds that give some protection against sulfur-based corrosion. To determine the corrosiveness of the fuel for silver, a freshly polished silver strip is suspended in 30 mL of sample which is heated at 50°C for 3 hours. At the end of the heating period, the silver strip is removed, washed, and the color and tarnish level assessed.

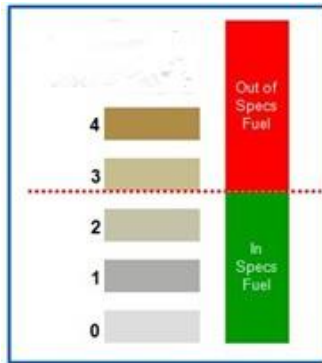


Figure 2 - Shows Examples of the Silver Corrosion Rating System

NACE (National Association of Corrosion Engineers) Corrosion

Small amounts of water, air, and polar compounds in a fuel product can cause serious internal corrosion of steel pipelines and tanks used for fuel transportation and distribution. This corrosion can lead to pipe or tank failure. The corrosion of steel is monitored by NACE Corrosion. In this test method, the surface of a cylindrical steel test specimen is prepared and then immersed in a mixture of the test fuel and distilled water. The mixture is stirred and is maintained at 38°C. The test specimen is then rated by the proportion of test surface that has corroded.



Figure 3 - Shows NACE corrosion examples, A is a passing rating, while E fails.

If you would like to be removed from our distribution list or you require information on a certain subject, please let us know via return email. Also, please be advised individual / group AmSpec laboratory / operational tours can be arranged upon request.

Please visit us on our website...www.amspecllc.com or contact us at (800) 286-2208

M = Methods

These are the most common methods that AmSpec uses to determine corrosiveness:

D130 – Corrosiveness to Copper from Petroleum Products by Copper Strip Test

D7671 – Corrosiveness to Silver by Automotive Spark-Ignition Engine Fuel – Silver Strip Method

TM0172 – Determining Corrosive Properties of Cargoes in Petroleum Product Pipelines

S = Scope

Method	Products	Scope
D130	Aviation gasoline, aviation turbine fuel, automotive gasoline, cleaners solvent, kerosene, diesel fuel, distillate fuel oil, lubricating oil, and natural gasoline	1 to 4 based on a visual rating scale
D7671	Automotive spark-ignition engine fuel	0 to 4 based on a visual rating scale
TM0172	Gasoline and distillate fuels	A to E based on a visual rating scale

*** Please note below, **Turnaround Time** is defined as the actual length of time, on average, it takes to perform a particular method once the sample has arrived and been logged in the lab, and prepared for testing.*

P = Procedure Notes

Method	Limitations	Instrumentation	Turnaround Time
D130	N/A	Copper	2 or 3 hours
D7671	Must have a vapor pressure less than 18 psi @ 38°C by either a pressure vessel or vented test tube	Silver	3 hours
TM0172	It does not predict corrosiveness in the standing aqueous phase, nor does it predict microbiological attack.	Steel	4 hours

If you would like to be removed from our distribution list or you require information on a certain subject, please let us know via return email.
Also, please be advised individual / group AmSpec laboratory / operational tours can be arranged upon request.

Please visit us on our website...www.amspecllc.com or contact us at (800) 286-2208

E = Equivalents

ASTM	IP	ISO	DIN	JIS	AFNOR
D130	154	2160	51759	K 2513	M07 - 015
D7671					
TM0172					

C = Cause & Effect

Corrosion can occur in fuels from sulfur compounds, contamination during storage, or air and water from transporting through pipelines. By determining the corrosiveness of the fuel for different metals, potential failures can be controlled and monitored.

For any questions about these methods, please contact Jennifer Nesci at JNesci@amspecllc.com

Also, please download the new & improved AmSpec Smart Phone app for a number of useful conversion tools and information.

If you would like to be removed from our distribution list or you require information on a certain subject, please let us know via return email.
Also, please be advised individual / group AmSpec laboratory / operational tours can be arranged upon request.

Please visit us on our website...www.amspecllc.com or contact us at (800) 286-2208